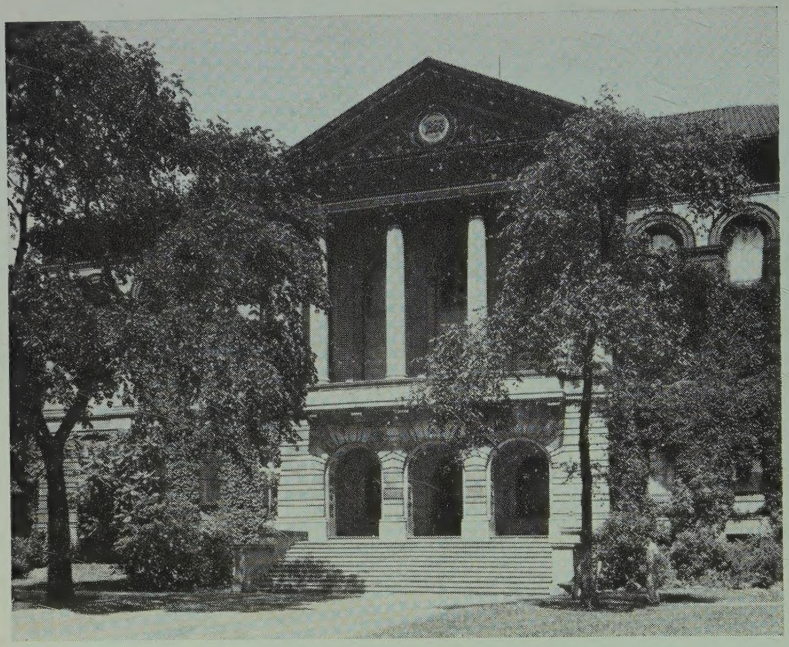
The CHICAGO NATURALIST

Published by

THE CHICAGO ACADEMY OF SCIENCES

VOL. 6 · NO. 1 ❖ ❖ ❖ APRIL · 1943



The Chicago Academy of Sciences

Lincoln Park · Clark Street and Ogden Avenue

NATHAN S. DAVIS, III, M. D., *President*

TAPPAN GREGORY, *Vice-President* V. O. GRAHAM, Ph.D., *Vice-President*

ALTON S. WINDSOR, *Secretary* HENRY S. HENSCHEN, *Treasurer*

HOWARD K. GLOYD, Ph.D., *Director of the Museum*

BOARD OF TRUSTEES

Burt A. Massee
Henry S. Henschen
Lloyd A. Laflin
Thomas D. Heed
William D. Cox
Lewis C. Walker
Nathan S. Davis, III, M. D.
Frances Dickinson, M. D.
Francis R. Dickinson
Eugene H. Garnett
Carroll H. Sudler
Hulburd Johnston
Henry B. Babson
John Nash Ott, Jr.

President of the Chicago Park District, ex officio

BOARD OF SCIENTIFIC GOVERNORS

Nathan S. Davis, III, M. D., Chairman

Tappan Gregory
Alton S. Windsor
C. L. Turner, Ph.D.
Charles A. Shull, Ph.D.
Verne O. Graham, Ph.D.
Hanford Tiffany, Ph.D.
Supt. of Schools, ex officio
Eugene H. Garnett
John R. Ball, Ph.D.
James P. Simonds, M. D.
A. E. Emerson, Ph.D.

Presidents of Affiliated Societies, ex officio

AFFILIATED SOCIETIES

State Microscopical Society of Illinois
Illinois Audubon Society
Chicago Entomological Society
Marquette Geologists Association

The Chicago Naturalist

Published four times a year by
THE CHICAGO ACADEMY OF SCIENCES
Lincoln Park · Clark Street and Ogden Avenue

VOLUME 6 APRIL, 1943 NUMBER 1

Contents

Tree-ring Chronology 3
Robert E. Bell

On Reading Mysteries [and Science Books] 8
Clifton Fadiman

Telling Time by the Stars 9
Maxwell E. Gibson

Our Forest Trees (Poem) 11
Orpheus Moyer Schantz

Some Fundamentals in the Philosophy of Science Museums . . 12
Clark Wissler

Museum Activities 15

The Naturalist's Book Shelf 19

Photograph by courtesy of the Museum of Science and Industry, Chicago.

The Redwood, largest and longest-lived of our North American trees, displays one of the most striking of nature's chronological records.

The arrows indicate, from the center outward, the annual growth ring which was just inside the bark layer when the following events took place:

(1) Tree began to grow	549	(6) Columbus in America	1492
(2) Birth of Mohammed	571	(7) Landing of the Pilgrims	1621
(3) Coronation of Charlemagne	800	(8) Declaration of Independence	1776
(4) Battle of Hastings	1066	(9) Chicago Fire	1871
(5) Magna Carta signed	1215	(10) Tree cut—Century of Progress	1933

Tree-ring Chronology

Robert E. Bell*

If you have ever remarked, "What a magnificent old tree, imagine what a story it could tell!" or if, upon seeing some old settler's log cabin, you have pondered over its age—then you will be interested in knowing that such seemingly impossible questions may be answered from the mute wood itself. In short, the answering of such questions are commonplace at the University of Chicago Dendrochronological Laboratory. These answers are simple when compared to the amount of information one may glean from reading the tree-ring records, once you have learned to interpret their meanings. Perhaps you have similar questions which you may answer by a little personal investigation, if so inclined.

Recently a friend of mine in examining some Indian mounds in a park near Dixon, Illinois, was confronted with the difficulty of deciding whether a low circular embankment was constructed by the Indians or was the result of some recent amusement activity in the park. Growing upon the earth embankment was a white oak tree about twelve inches in diameter which might have been 40 years old or 120 years old, depending upon the surrounding growing conditions. By use of a special tubular steel borer, a small core of wood was removed from the tree. Upon examining the tree-ring record, it was established that the tree had been growing since 1856; thus the possibility that the earthwork was a result of recent activity in the park was eliminated.

The analysis and translation of tree-ring records, or dendrochronology, is but an infant in the scientific field. In brief, Dr. A. E. Douglass, who can rightfully be considered the founder of such studies, began his research in 1901 and continues today, with full vigor, to point out its importance and potentialities, particularly as applicable to the study of past climate.

The principle behind tree-rings is simple, although detailed analysis becomes complex. Trees respond to the environment, growing well in favorable years and poorly in years of drought or other hardship. This swing from lean years to fat years produces a pattern in the tree-ring record—narrow rings for hard years, wide rings for easy years. This pattern is duplicated on all trees growing within the same weather area. Hence, by examining the tree-ring record, one can recognize patterns of growth which represent the climate for the years concerned. If a tree which was cut last December is considered, the outside ring represents the tree growth for 1942, the next ring 1941, and so on

*University Fellow and Supervisor of the Dendrochronology Laboratory, Department of Anthropology, University of Chicago.

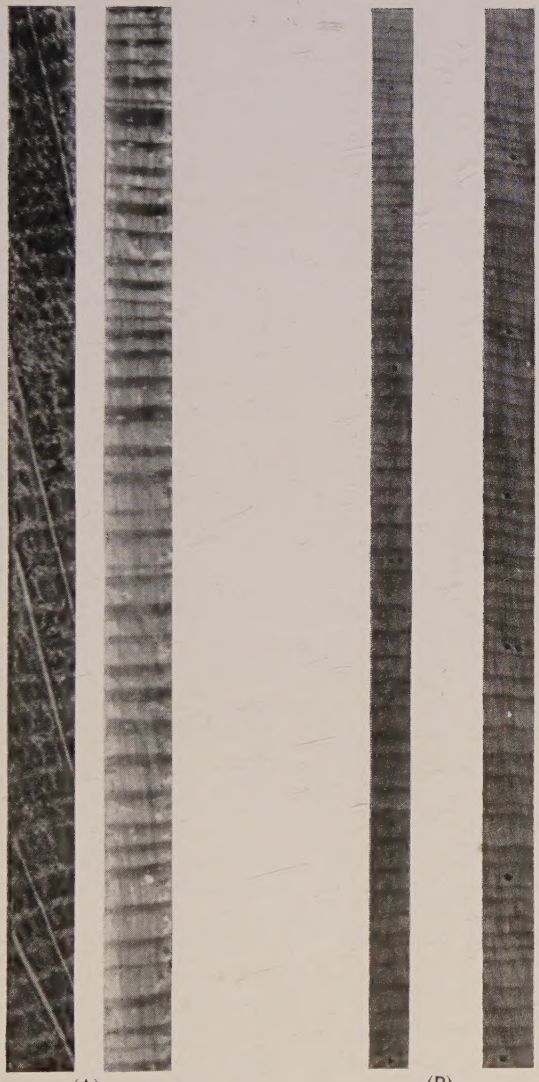
toward the center of the tree. Suppose this tree was 150 years old; then it would show a weather record covering these years. Narrow rings represent the lean years, wide rings the fat years. By counting backwards from 1942, the lean years can be dated. Upon inquiry into governmental weather station data, these lean years may be confirmed for as long a period as the station has operated—usually for around 50 years. Our specimen, however, carries a record for the past 150 years, 100 years longer than most weather stations. If we should have a 200 year old tree—a 300 year old tree—the possibility of extending our natural weather record seems unlimited!

In the southwestern United States, Dr. Douglass has been able to establish such a weather record back to 11 A. D. This has been possible through utilizing hundreds of tree-ring specimens and checking one with another by recording and comparing the tree-ring patterns. This weather diary has not been built entirely from living trees. By the principle of cross-dating it is possible to use the records of dead trees, trees whose history might otherwise remain unknown. For example, suppose we have a wood section taken from an old log cabin whose exact age is unknown. Upon examining the tree-rings we can discover three narrow rings followed by two wide rings, followed by two narrow rings, thus forming a recognizable ring pattern. By comparison with another tree whose ring dates are already known, and a recognition of the above pattern, the ring sequence can be given actual year dates. If this pattern falls around the outside of our cabin specimen, perhaps the inside rings will add to our already expanding weather record. By cross-dating from the known to the unknown, from the historic to the prehistoric, a tree-ring chart may be pushed slowly and patiently into the past.

Once this tree-ring weather chart has been established, much can be interpreted from its record. Many branches of learning have received valuable information from tree-ring records—information which at first appeared inaccessible.

Dr. Douglass' original research was stimulated by his interest in sun spot activity. He sought records covering hundreds of years, and he found them in the tree-rings. He reasoned, logically, that if sun spots effect the weather and the weather effects tree growth, then tree growth should give us a record of sun spot activity. It did, and Douglass had discovered the necessary data to continue his studies.

The archaeologist has probably received the greatest benefit from tree-ring research. By cross-dating wood specimens taken from prehistoric structures with a dated tree-ring chart, it has been possible to assign actual year dates to many ancient cultures. In New Mexico and Arizona hundreds of prehistoric ruins have been dated by dendrochronology. We have learned, for example, that the large ruins of Chaco



(A) (B)

Cross-sections prepared for tree-ring analysis.

(A) An oak specimen (left) from eastern Pennsylvania and a specimen of yellow pine (right) from Arkansas show characteristic species differences in ring formation. (B) Two specimens of red cedar which cross-date. The trees grew eighteen miles apart. Reading from the bottom upward, the ring sequence covers the period 1830 to 1890, single pin dots marking ten year intervals with two dots in the 1850 ring. Note the correspondence in ring patterns, especially for the narrow rings occuring in 1843, 1856, 1879, and 1881.

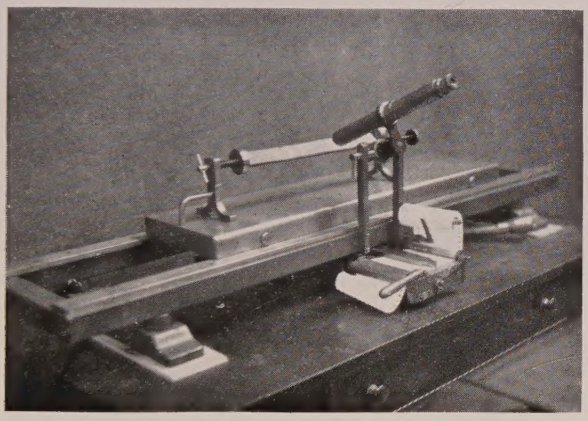
Canyon, New Mexico, were inhabited and booming with activity in the early 1100's A. D., that the great drought from 1276 A. D. to 1299 A. D. had much to do with the final abandonment of the Cliff Dwellings at Mesa Verde, and that Mummy Cave was occupied at least as early as 348 A. D. The archaeologist, in turn, by supplying wood specimens, helps in adding to the tree-ring weather record. He alone can supply specimens which will extend the tree-ring charts into the really distant past.

Foresters, botanists, and climatologists are all profiting by tree-ring research. The Forest Service has used it to learn about insects. Botanists are using it to compare reactions of native and imported trees to weather variations. They are interested in the effects of rainfall, temperature, soils, etc., upon tree growth. Through the study of tree-rings the lumbermen learn what they can do to produce more timber, how they can produce the type of lumber they want, or when timber is ready for cutting. Climatologists trying to master long-range weather forecasting learn from tree-rings a host of facts otherwise unavailable. The presence of drought periods occurring and recurring in consistent cycles over hundreds of years hints as to the weather of the future. The Tennessee Valley Authority installed a tree-ring laboratory for the light it could shed on rainfall, therefore on dam building.

Impressed by the possibilities of tree-ring research, the Department of Anthropology at the University of Chicago founded a Dendrochronological Laboratory in 1934. Since that time, thousands of specimens have been collected and examined, specimens from Wisconsin to Louisiana, from Oklahoma to New England.

The primary aim of the Chicago laboratory is archaeological. During excavations in prehistoric mounds or ancient village sites, fragments of charred wood are frequently found. Often these bits of charcoal are remains of former wooden structures—house-posts, palisades, or roof beams. If a ring pattern occurring on some such mound builder specimen can be recognized and cross-dated with a known tree-ring chart, then the age of the structure is known. This gives the archaeologist a starting point upon which to establish an absolute chronology, a chronology based on calendar dates. Archaeological dating by tree-rings is an old story in the American Southwest, but its application in the Mississippi Valley is just beginning. Several things have impeded progress. For example, the amount of wood specimens salvaged from excavations is pitifully small. Many of these have few rings or display no distinctive growth patterns. Also, some trees do not record the weather as well as others, and in certain cases the tree-rings are extremely difficult if not impossible to read. A tree growing in good soil and enjoying a constant water supply and plenty of sunshine will not react to weather variations as well as a tree growing on a barren hillside.

Oaks, pines, cedars and hemlocks seem to produce the best weather records, while maples, sycamores, poplars and similar water-loving trees display poor records. Since the Indian was heedless of this detail, he used whatever timber was handy or easiest for him to obtain. Consequently dendrochronologists have had to search hard and long for specimens suitable in this respect for dating purposes.



Dendrochronograph used by the University of Chicago laboratory.

It measures, records, and plots tree-ring records. Accurate to one-thousandth of an inch.

Another difficulty is that of securing modern trees displaying long ring records. It is easy to get trees with records covering the past 150 or 200 years, but trees born over 300 years ago are hard to find. In the populated Midwest, virgin timber was cut off and sawed for lumber years ago, most of these stumps have long since rotted away, and only with diligent search in isolated or inaccessible places can one find occasional survivals. Such trees are essential if the weather record is to extend very far into the past. Fieldworkers have succeeded in locating some of these old trees. An oak from Missouri goes back to 1569, a pine from Arkansas to 1620, a hemlock from Wisconsin to 1502, and cedars from Tennessee to the early 1300's. A recent prize specimen, found near De Soto, Missouri, is a red cedar whose record goes back to 1120 A. D.

Cross-sections from old cabins, churches, barns, bridges, taverns, etc., make excellent tree-ring specimens. The older the better. Cross-sections or V-shaped wedges are cut from stumps or large logs. For living trees, a special tubular borer is used. It extracts a small wood core with no more injury to the tree than a pin-prick to one's health. For beams where cross-sections are impractical, another type of drill

removes a wooden core. Pencil rubbings are sometimes taken where hasty surveys are necessary. Charcoal, rotten or water-soaked wood is always specially preserved in the laboratory, where each specimen is carefully wrapped with soft cloth and saturated with paraffin.

Laboratory techniques are simple. Specimens are cut from bark to center with a razor blade and are examined with a 10 or 20-power magnifying glass. Kerosene sprayed over the surface helps to bring the rings clearly to view. Sometimes special lighting is necessary.

Various factors often complicate the tree-ring record. There are missing rings, false or double rings, frost rings, effects of fire, lightning scars, and many other obstacles to be dealt with. All these things make reading of tree-ring records more difficult—but more interesting.

On Reading Mysteries*
[and Science Books]

CLIFTON FADIMAN

. . . . In the course of my business life (my trade is that of professional book reviewer) I am compelled to read a great many books and to examine a great many more. In consequence, I read hardly at all for my own pleasure. But there are two kinds of book that I do read with my amateur spectacles on. The first kind is books about science, and I read them even when I have but a foggy idea of what they're about. The second kind is mysteries.

They don't seem at all related, do they? Yet I think I read them both for the same reason. They represent my private escapes from chaos.

It's apparent that most fiction and nonfiction today are bound to reflect the uncertainty of our epoch. For the most part our books are concerned with transitional things, transitional people, transitional ideas. No doubt of it, we are passing from one age to another, violently, overquickly; and our writers cannot help being obsessed or at least influenced by that simple, brute fact.

But there's something in us that rebels against transition and change, just as there's something in us that welcomes them. There's a part of us that cries out, particularly these days, for a vision of a just, ordered, *sensible* world. Now the world of science seems to hold out just such a vision, and that's why, within the narrow limits of my comprehension, I read books about it.

But the world of the mystery story (which, of course, is a fake world, and invented world, as against the checkable world of science) holds out the same vision. Both kinds of books are like magic looking-glasses through which you step into a room where everything is neat, ordered, arranged. Science's final aim is to discover (and if possible to apply) the laws underlying the operation of the entire universe. The aim of the detective story is somewhat more modest but in a way is related. The essence of the detective story's charm lies in the circumstance that it confronts the reader with a situation of maximum confusion, which it (or rather the detective) reduces to maximum order. This is really what Einstein does, too—they tell me . . . .

*Reprinted in part from an article, "On Reading Mysteries," *Good Housekeeping*, February, 1943.

Telling Time by the Stars

Maxwell E. Gibson

From the moment that man was first able to make himself understood, time undoubtedly became a subject of the utmost importance to him. As his knowledge increased and as his need for a yardstick or a measure of events became more necessary, he began seeking ways of telling time.

Time is important—perhaps the most important thing in our modern world. Without a means of measuring time, there would be chaos. It is true we could struggle along without clocks. We could arise at daybreak and go to bed at sundown, but the modern world could not fit itself to this schedule. Without doubt, as the tempo of life increased and as speed became the obsession of man, the need of a satisfactory method of telling time was man's number one problem.

It is difficult to say just which is the most efficient method of reckoning time, but unquestionably methods of telling time by the stars are among the oldest. The shepherd of biblical times, spending the long hours of the night tending his flocks, was a keen student of telling time by the stars. Even today, while the hustle and bustle of everyday life gives little chance for thought on the matter, it is interesting to note that the clocks at the Naval Observatory at Washington are set to Sidereal Time, the same time that absorbed much of the attention of the shepherd.

Today, of course, with our modern clocks and the many devices for registering time, telling time by the stars on the part of an individual can only be classified as a hobby. It is, however, an interesting one, and one on which many pleasant hours can be spent. In these times, even the smattering of astronomical knowledge necessary to tell time by the stars may have a life or death value to the individual, for we have recently heard of seamen, and soldiers too, adrift on their tiny life rafts, who perhaps owe their lives to just such an acquaintance with the heavens, developed as a hobby interest.

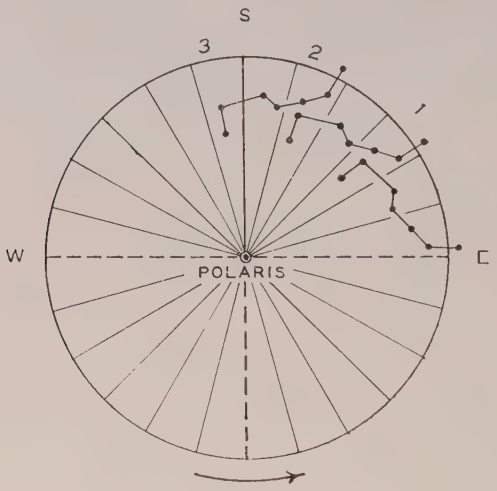
We have definite literary records* of the ancients' ability to tell time by the stars, and even our modern world has not lost the art entirely. Recently there appeared an article in the *National Geographic Magazine*,† relating how the people of the Gilbert Islands, in the war-torn part of the Pacific, taught their children not only to tell time by the stars, but to navigate many thousands of miles by them.

Perhaps the oldest method of telling time by the stars is by the Big Dipper (Ursa Major). This constellation is almost wholly circumpolar in this latitude, thus being visible in clear weather during the

*See Review of Grondal's *Romance of Astronomy* in this issue of *The Chicago Naturalist*.
†"War Finds its Way to the Gilbert Islands," *National Geographic Magazine*, January, 1943.

entire night. During the winter months, its position is partially below the Pole, so it is not always as easily seen as during the summer months, when it is high in the heavens.

The diagram shows the relative positions of the Big Dipper at the same hour during different months of the year. Knowing that the rotation of the earth causes the constellation to seem to move in a counter-clockwise direction, it is simple to compute the time (approximate, of course) by its various locations in the heavens during the night.



Star Dial—the pointer stars, the side of the bowl opposite the handle of the Big Dipper, rotate around the North Star in a counter-clockwise direction, across imaginary hour lines.

Position 1: location of Pointers at 10 P.M. on May 1.
Position 2: location of Pointers at 12 P.M. on May 1 or at 10 P.M. on June 1.
Position 3: location of Pointers at 2 A.M. on May 2 or at 10 P.M. on July 1.

In the diagram, the observer is looking directly at Polaris, the Pole Star, with the perpendicular line representing his meridian and the solid line containing his zenith. The dotted lines represent hour circles, twenty-four in all, for the twenty-four hours of the day. The heavier dotted line at right angles to the meridian is used simply to divide the circumpolar regions into four segments of six hours each, to facilitate our computations. The arrow indicates the direction of apparent motion.

By looking at Polaris with this diagram mentally superimposed on the sky, it is an easy matter to estimate the time. Position 1 indicates the approximate location of the Pointers of the Big Dipper at 10:00 P.M. Central War Time on May 1st at Chicago. Two hours later the Pointers would be at Position 2, four hours later at Position 3, etc.

Because the rotation of the earth is faster by nearly four minutes than the twenty-four hours shown on our clock dials, we can readily see that in fifteen days the Pointers would have gained nearly one hour of position. This gain of approximately one hour in fifteen days or two hours in thirty days would on June 1st at 10:00 P.M. place the Pointers at Position 2 on our imaginary clock, and our reckoning for this date should start from there. By following this procedure we can tell the time of night at any date in the year if the weather is sufficiently clear for the Pointers and Polaris to be visible.

It must be remembered that the method outlined above is rather crude and is intended for the person who does not wish to spend a great deal of time on the subject. It is, however, a fairly satisfactory means of temporal orientation, and with a small amount of study and practice one may become quite adept at telling the approximate time by the stars.

Where exact star time is needed, as by the astronomer or the navigator, then Sideral Time must be computed from an Almanac especially prepared for such use.

Our Forest Trees

I dearly love the mighty forest trees;
Their hospitable shade and graceful boughs
Are wondrous to behold. They gladly house
The nesting birds and in the cooling breeze
Their singing leaves soft music make for them.
The sturdy oaks, the swaying elms and birch,
The rounded maple and the graceful larch,
The soughing pine, that northern forest gem-
Can we not then the forest guard that they
In all their glory may forever be
A joy for future multitudes to see?

Orpheus Moyer Schantz

Some Fundamentals in the Philosophy of Science Museums

Clark Wissler *

Excerpts from an article in The Museum News, *February 1, 1943. Reprinted with permission of the American Association of Museums.*

The crucial fact in the museum function is the spontaneous interest of people in collections. If it were not spontaneous, museums would grow spasmodically instead of at a regularly accelerating pace as they do. The spontaneity of this public interest guarantees the permanence of museums. . . . .

The primary function of a museum of science is to house, conserve, and collect scientific material. It is the home of taxonomic science. It follows that the museum must classify its material, must have people on hand who know what it is about, and must make this material available when called for. . . . .

A visit to a museum is a non-book experience. At school most of the concepts and information come from text books; the school gives a textbook experience. The museum exhibit does something the school cannot do; it illustrates principles in science by making them concrete. The school uses up scientific materials if it uses them at all, it does not conserve them. It deals in concepts, rather isolated, specialized. That is the method of the school and probably the right method for it. It may never work in any other way. In neither the elementary nor the higher schools can the teachers do much in the way of concreting science for that is the combined job of those who know museum material working with the preparator.

Museum relations with the elementary schools are important. They are basic. It is doubtful that the museum should be satisfied with a passive role in education. Having concreted science, it may become militant, break into the schools and adult associations, to "put over" its concrete presentations.

Just where does the museum fit into the educational life of the nation? The approach to an answer may well lie in contemporary forward-looking concepts in education which may guide us in choosing and formulating exhibition and educational programs.

There are several cardinal objectives in education at large, that touch museums, for instance:

a. The appreciation of aesthetic materials, as in art, music, literature, etc.

b. The appreciation of the environment in which we live, especially a wider appreciation of the world we live in, or nature.

c. Appreciation of the culture in which we live, or the human environment.

The natural history museums emphasize *b*, or the appreciation of nature, but usually give more or less consideration to *c*, man's human environment. These objectives are realized through acquaintance with the relations between natural objects, one to the other, and to the individual.

Exhibition

By tradition a museum is obligated to exhibition. Yet exhibition halls are not ends in themselves. We mean by this that the exhibit is a means to the diffusion of knowledge and the stimulation of thought. It is also, in part, the basis of research. If our object is merely to make the hall beautiful and pleasing, it may then become an end in itself without regard to content or function. . . . .

Each generation of museum visitors comes to our exhibits with a different background. The behavior and attitude of visitors must be the museum's

*Dean of Scientific Staff and Curator in Chief, Department of Anthropology, American Museum of Natural History; President of American Association of Museums.

continuing concern. The information level of the visitor is changing. Today many adults of 50 years never went to high school; a few years from now most every visitor will have attended a high school. What used to be good enough for the 12-year-old may no longer hold in terms of experience. The museum curator usually underestimates the intelligence of visitors and greatly overestimates the information they possess. . . . .

Museum exhibits must not ignore reality. It may be that a museum's halls should exhibit ideas rather than things, but a visitor comes to a museum not to see charts and diagrams, but to see real objects. Large habitat groups have been questioned because so little in them is real. . . . .

Now there is evidence of a reaction in favor of a museum of ideas vs. objects. The tendency may be to pull out habitat groups and substitute ingenious devices for staging ideas. This again may run its course until such staging becomes an end in itself. The visitors may then view the exhibit as stage art and overlook the idea.

It would be possible to carry the exhibit of ideas to such an extreme that not a single real natural history object will be found in the exhibit; all would be artificial. This could easily become an absurdity. Thus one would ignore a fundamental principle of museum function, to make science concrete. Showmanship in museum exhibition is desirable, but it is "window dressing." You must have something real to show. Styles in such "window dressing" will evolve and prevail. The visitor will judge the exhibit not by the idea but by the originality in the style of presentation. He will soon tire of the old style and expect to see a new style each season.

Research

The primary function of a museum is to collect, house, and conserve objects; to classify them, to know them, and to interpret them. Acquisition, care of collections and research are the chief activities by which this function is realized.

Research in a natural history museum is limited to the "earth sciences." These sciences deal with living and extinct forms and with the structure of the earth. These sciences have geography; *What? Where? and When?* are the leading questions in the minds of the investigators as well as in the thoughts of visitors. In general museum emphasis is upon the history of life in the world. . . . .

Educational Activities

The term *museum education* includes all the museum's efforts to interest and inform the public; its special services for school children are but one part of its educational activity. It is assumed that one basic objective for a museum is the development of public interest in and knowledge of the broad domain of natural science. . . . .

Scientific departments claim complete control over exhibits, to originate them and to construct the same. They claim free hands in producing exhibits. The education department is the systematic user of such exhibits and values them according to their educational potentialities. No great wisdom is needed to predict that science departments and the department of education will hold each other in contempt and that at intervals there will be little cooperation between the two. There may be periods of open unrelenting conflict.

Yet certain trends are in evidence. The expected evolution of new types of showmanship in museum exhibitions will tend more and more to separate the functions of the curator and the educator. The educator will eventually become the designer of the exhibits, or the interpreter of scientific facts. This will break down departmental lines in exhibition space.

The Museum Visitor

. . . . If what the visitor may see in a hurried walk through the museum commands his respect, he leaves feeling that his time was profitably

spent. He has formed some idea of what the museum has to offer. If the museum is a large one, he is thrilled by the display of great riches potentially available to everyone.

He comes to the museum to see objects. He resents casts and models, even to the extent of boring holes into them with a pocket knife. Diagrams and charts he ignores. However he admires cleverness and skill, especially if the exhibition method is mysterious.

There are four main classes into which the museums' public is grouped by circumstances beyond the control of the museum. They must be recognized as realities. They are:

a. Casual visitors.

b. Elementary school teachers with classes.

c. Students from secondary schools, colleges, and universities.

d. Adults seeking adult education, organized and unorganized.

Visitors in each class require special consideration in exhibition procedure and educational activities.

The largest and most important class is composed of casual visitors. It is the spontaneous interest of this unorganized, unselected group which guarantees the permanance of museums and is responsible for their continued existence. We should respect the freedom and independence of this group. . . . .

We repeat that museums have come to be in response to a widespread spontaneous interest in antiquities, strange objects, and beautiful things. Visitors go to museums expecting to see such things. They expect museums to be honest and accurate—in other words to tell the truth.

Propaganda

Perhaps now more than ever before, museums face a crucial test. So far, of all institutions in America, they are the least suspected of propaganda. . . . . Yet pressure is applied by public men seeking to make museums propaganda agencies for social objectives, to lead more of them to do something different from what they are doing now. There are examples in parts of the world of how museums may be used by government for direct propaganda. The spectacle is not inviting. . . . .

Let us hope that the museum of the future escapes the hard fist of political and social propaganda so that it may continue to be a place of intellectual freedom. . . . .

Significance of the Foregoing

In the twentieth century, science has become the prerogative of specialists with the public supinely willing to accept the dogmas of intellectual authority.

Lack of organized interest on the part of the public in personal exploration of the new fields of science is a serious handicap to the educational work of science museums.

Such museums are service institutions to satisfy demands by the public but they are not competent to awaken and to organize such demands.

In aggressively reaching a public and holding a sustained interest, look for existing clubs and organized groups spontaneously originated, offering to assist them in the spontaneous use of the museum. Schools are in a class of their own; they maintain an organized drive to use museums. . . . .

The trend now is toward the illustrated text-book type of exhibit, or "ideas instead of things." Yet the emphasis tends to be upon stunts in staging, in novel accessories of lighting effects and colors. It is inevitable that this new interest shall have its day. We are willing to go along with it until it becomes an end in itself. Until then it will give the visitor something new and novel; it may relieve the scientific staff of its primary exhibition responsibilities and enhance the position of departments of education; it may break up the severe departmentalization of exhibits and present scientific materials in a broad way. Yet we predict that it will run its course and that a reaction will eventually set in to return to plain scientific reality.

Museum Activities

Dunes Exhibits

The above illustration shows a recently completed section in the series of exhibits on the ecology of the Indiana Dunes. It represents the Beach-Foredune Community. The construction of exhibits is proceeding more slowly because of wartime restrictions but satisfactory progress, commensurate with present conditions, is being made.

Lobby Exhibits

Mushrooms—Helene Warder Beggs' collection of life-size water-color paintings—is the feature exhibit this spring in the lobby of the Museum. This is the first Chicago showing of a most unusual collection, which has recently been on display at the Morton Arboretum and in Joliet.

Mrs. Beggs, a Plainfield artist, many years ago became interested in mushrooms as little-noticed natural objects whose unusual shapes and beautiful color schemes made them challenging subject matter for the water-color artist's brush. She found, as have many others who love to roam the meadows and woods, that, once one starts noticing fungi, scientific curiosity is inevitably aroused, for their wide range of characteristics, habits and habitats, and mysteriously sudden appearance and disappearance make them among the most fascinating of plants.

Mushrooms, besides being a group of little-known, interesting and often very attractive plants, are a practically untapped source of wild food—a point which takes on added significance in these days of food rationing. In the Academy ex-

hibit not only the usefulness of certain species is pointed out but also the cautious selection necessary in utilizing this food source. Travel restrictions need be no particular handicap to the mushroom collector as a crop can be harvested from his own or his neighbor's yard or even in the parkways of a city apartment area.

Annual Meeting

The eighty-sixth annual meeting of The Chicago Academy of Sciences was held Monday evening, April 12, in the Academy Auditorium. Officers elected for the current year are: Dr. Nathan S. Davis, President; Tappan Gregory, First Vice-President; Dr. Verne O. Graham, Second Vice-President; Alton S. Windsor, Secretary. Burt A. Massee was re-elected a Trustee for a term of six years, and Drs. Alfred Emerson and C. L. Turner were re-elected as Scientific Governors for terms of three years.

Dr. Charles Emerson Peet, Professor emeritus of Lewis Institute, was elected to honorary membership. The following annual members were elected: *Sustaining*, Dr. Ira Frank; *Associate*, C. J. Borth, Maxwell E. Gibson, Miss Verna Johnston, Dr. Warren N. Keck, John E. Kraft, Henry Kusch, Edward J. Lace, Lt. Gordon N. Murray, Jerry Scherba, Mrs. F. W. Schmidt, Sister Mary Natalia, F. A. Varrelman, Oscar T. Wickert, Miss Nelda A. Wolf, and Miss Grace E. Zern.

The annual address, "Race Relations and Nationality Problems in Brazil," was delivered by Octavio Eduardo of Sao Paulo, Brazil, who is in this country for the purpose of engaging in graduate study and research under Dr. M. J. Herskovits in the Department of Anthropology at Northwestern University.

Williams Commissioned

Dr. Eliot C. Williams, assistant to the director, who was called into military service last June, received his commission as 2nd Lieutenant in the Chemical Warfare Service of the U. S. Army at Edgewood Arsenal, Maryland, on January 23, 1943. Lt. Williams visited the Academy the following week while in Chicago on leave. He is now stationed at a replacement center in Pennsylvania.

Bird-banding Conference

On March 20 the Chicago Academy of Sciences was host to the Third Annual Chicagoland Bird-banding Conference, sponsored jointly by the Wm. I. Lyon Bird-banding Council, the Inland Bird Banding Association, and the Academy. All three sessions of the all-day meeting were very well attended, the total attendance registered being 105. A dinner was held at the Parkway Hotel between the afternoon and evening sessions.

Saturday Programs for Young People

A new educational feature, the Saturday Morning Programs for Young People, was inaugurated this spring. This is the first educational work planned especially for children at the Academy for thirteen years. The large attendance at the first two programs—127 at the first and 138 at the second—is largely due to the excellent coöperation by the schools and newspapers in announcing the new service. This enthusiastic reception reflects the need for such recreational education in this neighborhood. In these days of difficult transportation, when there are fewer opportunities for Saturday hikes and excursions, children are naturally looking for entertainment and hobby interests nearer home. The Chicago Academy of Sciences has the only Natural History Museum in Chicago which is located in a family neighborhood.

The Saturday programs, under the supervision of Miss Harriet M. Smith, Assistant to the Director, are designed primarily for children from the fourth grade of grammar school upward. The young people meet on a purely voluntary basis in the Academy Auditorium at 11:00 A. M. each week from April 3 through May 29 to enjoy programs on natural history—movies, phonographic recordings, and illustrated talks by staff members and friends of the Academy.

This spring, interest centers in the birds returning over the Mississippi Flyway to homes in Chicagoland and northward. For this reason the young people's program has been coördinated with the Illinois Audubon Society's Saturday Morning Bird Walks in Lincoln Park, conducted by Miss Doris A. Plapp, Secretary of the Society. The group leaves the Academy building at 8:00 A. M. and returns in time for the bird programs in the auditorium at 11:00 A. M. The complete list for this spring follows:

April 3 "Birds of Chicagoland"
A motion picture and talk by E. R. Ford.

April 10 "Bird Songs and Singers in Wood and Garden"
Phonographic recordings of bird songs accompanied by slides and comments on each singer by Miss Doris A. Plapp, Secretary of the Illinois Audubon Society.

April 17 "Birds of the Desert"
Motion pictures in color taken on the Academy's Arizona Expeditions with commentary by H. K. Gloyd.

April 24 "Birds of the Northeast Coast"
A motion picture with commentary by E. R. Ford.

May 1 "Haunts for the Hunted" and "The Western Grebe"
Motion pictures in color loaned by the Fish and Wildlife Service of the U. S. Department of the Interior.

May 8 "Birds of the Southern Swamps and Bayous"
Motion pictures taken in Louisiana, with commentary by F. R. Dickinson.

May 15 "Bird Songs and Singers of Our Fields and of the West"
Phonographic recordings and slides with commentary by Miss Doris A. Plapp.

May 22 "Western Birds"
Motion pictures with accompanying talk by F. R. Dickinson.

May 29 "Birds as Neighbors"
An illustrated talk by Mrs. J. Benton Schaub, President of the Evanston Bird Club.

New Booklet on Educationl Program

A small booklet on this season's educational activities and facilities of the Academy was published in March. Over 1000 copies of *Educational Program, Spring, 1943* have been distributed to Academy members and principals, supervisors, and science teachers of the Chicago schools—public, private, and parochial. The initial mailing to the neighboring schools and an announcement in the *Superintendent's Bulletin* elicited so many requests from teachers and class representatives for additional copies that the present supply is almost exhausted. Readers of *The Chicago Naturalist* who have not received this booklet and wish to obtain a copy may receive one free if requests reach the Academy while the present supply lasts.

New Technical Publication

On February 11, "A Synopsis of the American Forms of *Agkistrodon*" by Howard K. Gloyd and Roger Conant was issued as Volume 7, Number 2 of the *Bulletin of the Chicago Academy of Sciences*.

Active members of the Academy may obtain any of the technical papers without charge upon request.

Recent Visitors

Mr. Alfred M. Bailey, former Director of the Academy's Museum and now Director of the Colorado Museum of Natural History, visited the Academy in March.

Mr. Frederick C. Lincoln, In Charge of the Distribution and Migration of Birds, Fish and Wildlife Service of the U. S. Department of the Interior, came from Washington to attend the Chicagoland Bird-banding Conference on March 20.

Cowles Society Symposium

A symposium, "Experimental Botany in the Laboratory and in the Field," was presented at a meeting of the Cowles Botanical Society on April 20. To encourage and direct interest in botany, a crucial field in the world's wartime economy, special invitations were extended to students and science teachers to attend this symposium, at which thumb-nail sketches of worth-while problems for current investigations by students in the various fields of botany were presented by Dr. Scott V. Eaton, Dr. Paul D. Voth, and Dr. Charles E. Olmstead of the Botany Department at the University of Chicago; Mr. C. Edwin Hewitt of the Lincoln Park Conservatory; and Dr. Glen B. Ramsay of the Bureau of Plant Industry, U. S. Department of Agriculture.

Recent Public Lectures

Under the auspices of the Illinois Audubon Society, two lectures illustrated with Kodachrome motion pictures were presented in the Academy Auditorium: "From Seashore to Glacier," by Karl Maslowski, March 5, and "Wild Wings," by Murl Deusing of the Milwaukee Public Museum, April 23.

At a joint meeting of the State Microscopical Society and the Chicago Society of Medical Technologists, April 16, Dr. Chi Che Wang gave a brief talk on the consequences of vitamin B 1 deficiency as an introduction to a color motion picture on that subject filmed and recorded by E. R. Squibb and Sons.

Bird Walks in Lincoln Park

The Illinois Audubon Society again sponsors a spring series of bird walks under the leadership of Miss Doris A. Plapp. The groups leave the Academy building at 8:00 every Saturday morning, April 3 through May 29, returning before 11:00 in time for the Young Peoples' Programs which are devoted to birds.

The Naturalist's Book Shelf

Man's Poor Relations

By Earnest Hooton

Doubleday, Doran and Company, Inc. New York. 1942. 412 pages, bibliography, index, illustrated by linecuts and numerous portrait photographs $5.00.

Dr. Hooton's inimitable literary style in handling scientific subjects makes direct quotations the most adequate review of his recent book, *Man's Poor Relations*. "In this book an anthropologist will attempt to study some other animals as he would study man. The animals thus to be victimized are a group which the zoological classifiers call primates—lemurs, tarsiers, monkeys, and apes. These are supposed to be man's poor relations—some of them very distant, others uncomfortably near." While "the zoologist stresses structure . . . . and the implications of relationship which are based on similarities in structural features, ... the anthropologist takes a group of human beings as he finds them, living together, and proceeds to describe their physical appearance, their habitations, arts, industries, and general behavior." Zoologists studying animal behavior are so "fearful of explaining the habits and characteristics of subhuman animals in human terms, ... of anthropomorphizing the apes," that the usual result is "a strained dehumanization which, combined with a terminology devised to be non-committal in regard to human parallels, renders a fascinating subject unspeakably dreary and barely comprehensible."

The typical Hootonian reaction when faced with an immense technical literature written in this style was to bring together in entertaining and easily digested form the pertinent data on the ecology, sociology, and psychology of the primates — ideal subject matter for the author's characteristic, ironically witty, literary style. The treatment, however, is far from flippant or superficial, and "For the benefit of the more avidly scientific some pages of smaller print have been added at the end of each chapter."

The titles of sections into which the book is divided give the scope and reflect the treatment of each subdivision: *An Anthropologist Looks at the Primates and Then Looks Back at Himself, Ape Aristocrats* ("Chimpanzee—the Extravert Type," "The Gorilla Individualist," "The Reactionary Orang-Utan," "The Acrobatic Gibbon"), *Totalitarian Monkeys of the Old World, New World Democrats and Proletarians, Man and His Primate Peers and Inferiors.*

Dr. Hooton, Professor of Physical Anthropology at Harvard University, points out that, while most of man's physical differences from the great apes are in the nature of eccentricities rather than superior biological equipment, he has developed two faculties —tool-making ability and the ability to communicate his ideas through language—which seem to be the overt expressions of a mental ability which is uniquely human. It is through observing and testing the extent to which each species of primate approximates human capacities in communication and social life and in manual and mental dexterity in the use of objects as tools that primatologists have attempted to gauge subhuman intelligence. Professor Hooton's entertaining accounts of these observations and experiments are thought-provoking and not entirely conducive to self-satisfaction in man's superior mental and material attainments over those of his poor relations.

Harriet M. Smith

Common Edible Mushrooms

By Clyde M. Christensen

University of Minnesota Press, 1943, 124 pages, 4 colored-plates, 2 diagrams, 62 figures. $2.50.

This small book covers briefly the several large groups of mushrooms, including gilled mushrooms, puffballs, morels, a few of the Polyporaceae, some of the club fungi, Hydnums, and the "trembling fungi." Many clear pictures prove helpful to the amateur student of mushrooms. The book also contains recipes for the preparation of mushrooms for the table. Containing much information, delightfully presented, this book should prove stimulating to every amateur student and valuable in introducing beginners to the study of fungi.

V. O. Graham

The Romance of Astronomy

By Florence Armstrong Grondal

The Macmillan Company, New York, 1942, xiii, 334 pages, numerous photographs, drawings, and diagrams, pronouncing dictionary, index. $1.98.

This charming book, previously published under the title "Music of the Spheres," is subtitled on its jacket "A Nature Lover's Story of the Stars." Its greatly reduced price now permits its purchase for the home library for not only reference use but delightful browsing.

The author's friendly and humorous presentation blends, but does not confuse, scientific fact with history and legend. Quotations from classical literature make graphic the observable features of appearance and movement of the stars, constellations and planets. Thus Ovid described the constellations as:

"Monstrous shadows of prodigious size,
That deck'd with stars, lie scatter'd o'er the skies."
—*Ovid's Metamorphoses* (Addison's Trans.)

Reciprocally, the literary references are themselves clarified through a better understanding of the heavenly phenomena, with which the Greeks and Romans, ancient sailors and farmers, and primitive and folk peoples of all times seem to have been much more conversant—to have made more a part of their daily lives—than do we. A cryptic footnote "April" in our English Literature textbooks comes to life in the following statement: "The zodiacal constellations are very important, and to the people in the olden days, the sun's position in front of them was a way to tell the season of the year. The words of Chaucer

'and the young sonne
Hath in the Ram his halfe cours y-ronne'

meant to any ploughboy in England that it was April because during the first half of April the sun traverses the last half of Aries, the constellation of the Ram."

Interesting ancient nature lore on weather forecasting is quoted, interpreted, and evaluated thus:

In ancient times, Praesepe, the Manger, was an infallible weather sign, for if there was the slightest moisture in the air, its faint light was invisible. . . . .

"When shine the Bears, and 'twixt the asses seen, though faint, their Manger, ocean proves serene."
—*Idylliums of Theocritus* (Fawke's Trans.)

and:

"The Pleids and the Hiads make the seasons,
The Dogstarre maketh the heat of Sommer."
—1507, Golding De Mornay.

Throughout *The Romance of Astronomy* the author has endeavored "to arrange the constellations in this volume in the most easily-learned-without-effort way . . . . and to present them in such a manner that the student will go out of doors with a picture of the position of the stars in his mind . . . ." The reader will feel that Miss Grondal has not only accomplished this purpose but afforded a most enjoyable literary experience.

Harriet M. Smith

Wonders of the Sea

By Gladys Pratt Freund
Illustrated by Rudolph Freud.

Random House, New York, 1941, 36 pages, 15 color plates and 11 drawings. $1.00.

Designed for the whole family, *Wonders of the Sea* presents basic information on oceanography and the marvels of ocean life in the same concise, straightforward manner as does a museum label. While readily under-

stood by children, it does not "talk down to them."

Rudolph Freund's drawings and exquisite color plates—any one of eleven of which are suitable for framing—make the book a desirable addition to the naturalist's, artist's, or home library.

American Butterflies and Moths

By Cecile Hulse Matschat

Illustrated by Rudolph Freund.

Random House, New York, 1942. 68 pages, index, 13 color plates. $1.00.

A companion volume to *Wonders of the Sea, American Butterflies and Moths* in its text follows more the form of a handbook than does its predecessor in the series. It is intended to introduce nature lovers of all ages to a group of insects which in their life histories and relationship to human economics are as varied as in their appearance.

As usual, Rudolph Freund's illustrations are superb. Thirteen color plates and black-on-white and monotone sketches on all but ten of the sixty-eight text pages are not only of great assistance in identification but aesthetically delightful in themselves.

Harriet M. Smith

The Virus, Life's Enemy

By Kenneth M. Smith, F.R.S.

Cambridge University Press, The Macmillan Co., New York, 1941. viii, 176 pages, 19 figures. $2.00.

In this volume of the Cambridge Library of Modern Science, Kenneth M. Smith discusses in Part I the discovery of the virus, the methods used for its study, and the evidence for and against its being a living organism. In Part II, the author discusses "How Viruses Get About," their relationship to insects which spread them and to the living cell. He then takes up the important virus diseases of man and of domestic and wild animals, fish, and plants.

A clear presentation is given of the viruses, about which much is now being learned as techniques for their isolation and growth are being perfected. The development of the ultra microscope, which makes these very minute particles visible, has contributed and will continue to add to our knowledge of them, just as the microscope helped in the isolation and the differentiation of the bacteria which also cause many diseases of animals and plants. During the past few months several new virus diseases have been identified. People who wish to know more about the nature of viruses so that they may better understand references to them appearing in the public press will find this to be an invaluable handbook.

N. S. Davis

About Ourselves

By James G. Needham

The Jaques Cattell Press, Lancaster, Pennsylvania, 1941. xi, 276 pages, illustrated with line drawings, index. $3.00.

Dr. Needham has given a clear exposition of our zoological heritage and offered a new classification of the components of social behavior and of the instincts that serve the needs of our mind.

In the second part of this popular treatise "Society in its Biological Aspects" is discussed. Dr. Needham states in the chapter on government, "This will be a better world to live in when the resources of reason have been better organized and more adequately implemented for control. Our folkways prescribe small limitations to the rule of force and greed: only such controls as have been stumbled upon by the method of trial and error in the past; and reason has not made sufficient progress in its beneficent work of sifting out the error and evil, and redirecting the enthusiasms and energies of the world in better ways.

"We need to recognize the animal origin of human nature, mental as well as physical, not to magnify it, and certainly not to laud it, but to understand it; for understanding leads to control."

Careful consideration must be given such advice from one who feels that "Government drives and organizes; religion leads and sustains." Scientists who depend on facts proven by the methods of trial should be able to plan a better post-war world than can politicians, economists, and socialists who have axes to grind and rely on theories that have never been tested; that may even have been found not to work when tried in ages past.

N. S. Davis

Biological Symposia

The Jaques Cattell Press, Lancaster, Pennsylvania. Volumes I-IX.

I. *(1) The Cell Theory; (2) Mating Types and their Interactions in the Ciliate Infusoria; (3) Chromosome Structure.* 1940, 238 p., $2.50.

II. *(1) Speciation; (2) Defense Mechanisms in Plants and Animals; (3) Biological Basis of Social Problems; (4) Regeneration.* 1941, 270 p., $2.50.

III. *Muscle.* 1941, ix, 370 p., $3.50.

IV. *(1) Population Problem in Protozoa; (2) Experimental Control of Development and Differentiation; (3) Theoretical and Practical Aspects of Polyploidy in Crop Plants; (4) The Species Concept.* 1941, iv, 293 p., $3.00.

V. *(1) Comparative Biochemistry; (2) Intermediate Metabolism of Fats; (3) Carbohydrate Metabolism; (4) Biochemistry of Choline.* 1941, ix, 247 p., $3.00.

VI. *(1) Temperature and Evolution; (2) Isolating Mechanisms; (3) Genetic Control of Embryonic Development.* 1942, xii 355 p., $3.50.

VII. *Visual Mechanisms.* 1942, viii, 322 p., $3.25.

VIII. *Levels of Integration in Biological and Social Systems.* 1942, v, 240 p., $2.50.

IX. *Sex Hormones.* 1942, x, 146 p., $2.50.

An increasing interest in symposia has become notable during recent years. In some instances audiences have been unexpectedly large. Carefully planned presentations of subjects of special or timely interest make it possible for those in attendance to hear authoritative discussions—in relatively non-technical language and from varying points of view—of some of the more general problems in their own or closely related fields of investigation. Several of my acquaintances have remarked, on different occasions, that they planned to attend a meeting of this or that society especially because of a symposium. Others, unable to attend such meetings, deplored the uncertainty of seeing such discussions in print.

In publishing the important symposia listed above the Jaques Cattell Press is meeting a real need and rendering a meritorious service to biologists, whether they are actively engaged in research and teaching or simply wish to keep informed on subjects related to their special interests.

Critical reviews of such publications are not in order here but many have appeared in more technical journals (for example, see *Quarterly Review of Biology*, vol. 15, no. 4, December, 1940, and subsequent issues) and it is obvious that these symposia have been carefully selected, ably edited, and that high standards have been maintained throughout. The format, typography, illustrations, and bindings are commensurate with the requirements of the contents and the nominal sales price.

Individuals will naturally select volumes in accordance with their special interests, but the entire series should be in all college and university libraries. Museums in which systematic studies are being carried on will find Volume II (Part 1, *Speciation*), Volume IV (Part 4, *The Species Concept*), and Volume VI (Part 1, *Temperature and Evolution,* and Part 2, *Isolating Mechanisms*) especially valuable additions to their reference libraries.

H. K. Gloyd

Man on His Nature

By Sir Charles Sherrington, O.M.

The Macmillian Co., New York; At the University Press, Cambridge, 1941. 413 pages, 7 plates, line drawings and diagrams, index. $3.75.

The Gifford Lectures given at Edinburgh in 1937 and 1938 by the celebrated British physiologist, Sir Charles Sherrington, who in 1932 received the Nobel Prize in Medicine, have been published under the title of "Man on his Nature." In these lectures Sir Charles sums up the advances in our knowledge of life by contrasting the modern biologists' attitude with that of the leading scientists of 16th and 17th centuries and of earlier eras. This method of presentation emphasizes the advances in biological knowledge more dramatically than does the usual historical approach.

In the chapter on "Conflict with Nature" he states, "Altruism as passion; that would seem as yet Nature's noblest product; the greatest contribution made by man to Life." Yet, "The self is the biological pivot of the individual. . . . What are the most successful individuals which Life has to show? The multi-cellular. And what has gone into their making? The multi-cellular organism is in itself a variant from the perennial antagonism of cell to cell. Instead of that eternal antagonism it is making use of relatedness to bind cell to cell for co-operation. The multi-cellular organism stood for a change, in so far, from conflict between cell and cell to harmony between cell and cell . . . Conforming to a type [man] is yet always as individual unique . . No following life is like the one it followed."

It would seem from what Sir Charles wrote that the most successful states and nations and a world at peace could be attained if the people would, instead of that eternal antagonism of man to man, make use of relatedness to bind man to man and nation to nation for co-operation.

N. S. Davis

The Men Who Make the Future

By Bruce Bliven

Duell, Sloan and Pearce, New York, 1942. xiii, 325 pages. $3.00.

Bruce Bliven, a former newspaper editor who is now president of *The New Republic,* has written an excellent popular review of science today. He writes of the inventions and discoveries of scientists which have changed our lives and which may affect them in the future.

He feels that the free scientists of the democratic nations will accomplish much more than will the regimented scientists of the collectivist totalitarian states. As might be expected of a writer long associated with *The New Republic,* he does not appreciate the fact that the social scientists do not use the methods of science, the methods of trial and error. If they did they would not advocate legislative panaceas but instead would oppose such measures, which always result in standardization and prevent experimentation and progress.

Serious consideration should be given to Mr. Bliven's suggestion that scientists, even if social scientists are included, would probably be able to do more to bring about a permanent peace than would any other group in the population. Science has for years been international, in fact world-wide, in its scope. As a result, scientists are not handicapped, as are politicians and statesmen, whose interests have been national and local and much more selfish.

Scientists should abandon the seclusion of the laboratory, step out into the world arena to lead us to a permanent peace.

N. S. Davis

Turtox Kodachrome Slides

For the Biological Sciences

Beautiful natural color photographic transparencies in the popular 2″ x 2″ size, for projection or hand viewing.

There are *three hundred* bird photographs included in our listings; local wild flowers are well represented and many other groups are covered which will interest biologists in general.

Price 50c each - in lots of eleven or more

Ask for our catalog No. 429

TURTOX PRODUCTS

GENERAL BIOLOGICAL SUPPLY HOUSE
(Incorporated)
761-763 EAST SIXTY-NINTH PLACE, CHICAGO
The Sign of the Turtox Pledges Absolute Satisfaction

RELAX - ENJOY NATURE'S BEAUTY

Audubon Feeders keep birds in full view while feeding and attract them without much delay.

AUTOMATIC FEEDER with plastic tube $2.00

SQUIRREL'S DEFEAT, automatic with plastic tube 4.50

"EYE-SAFE" FEEDER, for suet, bread, cheese; practically everything but seeds 1.50

SQUIRREL-PROOF "EYE-SAFE" Feeder 3.50

ORANGE FEEDER, for oranges (Orioles) and apples 1.35

FLORAL CUPS (from 75c up) and FLORAL FOUNTAIN 2.00
beautifully hand blown, for Humming Birds.

AUDUBON WATER FOUNTAIN, electrically heated and thermostatically controlled, to furnish drinking water in cold weather 9.50

ASK FOR OUR FOLDER

audubon workshop
NOT INCORPORATED
GLENCOE, ILLINOIS
Obtainable also from Illinois Audubon Society, 2001 N. Clark St., Chicago

The Chicago Academy of Sciences is dedicated to education and research in the natural sciences; if you believe in the work that it is carrying on, why not support some phase of this activity by gift or bequest? Bequests to the Academy may take the form of securities, money, books or collections. If the donor desires, bequests may constitute a memorial for a specified purpose.

Suggested form of bequest

I hereby give, devise and bequeath to The Chicago Academy of Sciences:

(Name the property and funds devised)

_____

_____

_____

even a scientist can be sordidly commercial

LET'S SWAP Cameras

Just because your head is in the purely scientific clouds . . . is no reason for not striking a real bargain when it comes to buying or swapping cameras here in the Camera Crossroads of the World.

Every transaction . . . a swap, or an outright purchase is on our famous "money back with a smile" guarantee.

Write Dept. C. N.

GRAFLEX
GRAPHIC
PLATE CAMERAS
CONTAX
LEICA
ROLLIEFLEX

as well as complete 8 and 16 mm. Cine apparatus

Bass Camera Co.

179 W. MADISON ST., CHICAGO, ILL.

MEMBERSHIP

in

The Chicago Academy of Sciences

helps support

The Museum of Natural History

Public lectures throughout the fall and winter months

Extension work in cooperation with the schools and the Chicago Park District

Field studies of local flora and fauna and expeditions to other regions

Research by staff members

Publications, both technical and popular

Libraries, a children's library and a scientific library

Although the Academy is at present filling a definite place in the educational life of the Chicago Region, its resources are inadequate for the services it is potentially able to render. Those interested in advancing studies in the field of natural history are invited to help by supporting such activities through membership in the Academy.

PRIVILEGES OF MEMBERSHIP

All members of the Academy receive *The Chicago Naturalist* four times a year . . . Special announcements of lectures and other activities . . . Reserved seats for Academy lectures . . . Access to the study collections . . . Use of the scientific library and reading room . . . Cordial assistance from members of the museum staff in connection with studies or special interests.

MEMBERSHIP FEES

Contributing, annually	$25	Life Membership	$100
Sustaining, annually	$10	Fellow	$500
Associate, annually	$3	Patron	$1000

THE CHICAGO NATURALIST

is now available to institutions such as libraries, schools, clubs, and comparable organizations at a subscription price of $1.50 per year.